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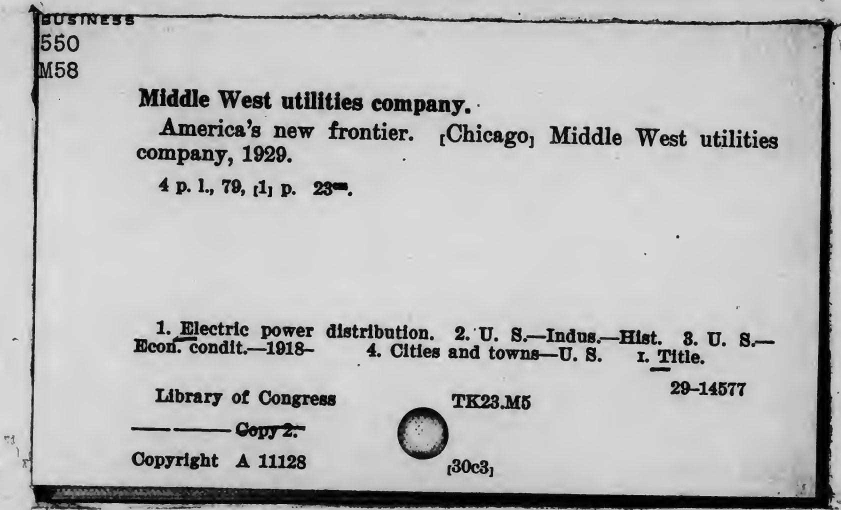

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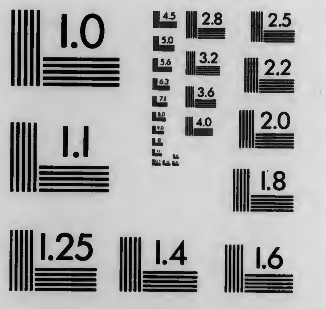

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"THE SMALL TOWNS *comprise our new industrial frontier.*

"*The tendency of the early days of steam power development was towards centralization and congestion, but it has brought its own cure for this. The development of the steam turbine and of widespread electric transmission has permitted general distribution of electrical energy all over the country, even to the smallest hamlet and the farm. It is no longer necessary that manufacture should be centralized in crowded cities. With adequate transportation and power supply, the small towns are relieved of handicaps that formerly diverted industry to the larger centers. This is a promising sign of a simplified economic structure.*"

MARTIN J. INSULL
President of Middle West Utilities Company

In an address before
American Society of Civil Engineers
Dallas, Texas, April 24, 1929

America's New Frontier

I.

POWER: CONFINED OR DISTRIBUTED?

Civilization in its most practical aspect is the organization of men to do the world's work. Different types of organization are found in various countries and the modes of organization change from time to time.

A careful study of present day industrial practices and trade currents in America suggests that a profound and far-reaching change in our business life (and, necessarily, in our civilization) began about 1910, and is now revealing itself gradually but definitely. This change is the decentralization and the wider spread of industrial activities, and a more general diffusion of wealth and good living over the land.

Unlike former economic advances and geographical shifts of business, this new trend has been relatively independent of population density, growth or movement. It has its basis rather in the changes in the nature of power supply during the past decade or more.

In a civilization based on *power*, the sections of the country will thrive or decline according to whether they have power or lack it.

The power supply upon which American progress up to 1910 was based had one serious defect. It was confined. Ample, reliable, cheap power was to be had only within limited and more or less densely populated areas. This, of course, tended to centralize industry. The significance of the date 1910 is, roughly speaking, that it was the year which witnessed the beginning of widespread distribution of power—a power supply diffused over the countryside, not confined to limited areas.

POWER IN MODERN LIFE

The importance of electric power in America's spectacular industrial progress (considering power, for the moment, simply as a force at work without regard to how widely it is distributed geographically) is a story with which everybody is reasonably familiar, although the very cheapness of it in relation to other elements of production tends to obscure its tremendous significance.

In these days of billion dollar corporations, with cities of 6,000,000 population, with millions of stock and bondholders, we talk largely of economics and finance, but are likely to overlook the importance and potentialities of that quiet, unobtrusive but irresistible economic force, electrical energy, which appears on our electric light bills under the name of kilowatt-hour, defined as the unit of energy which in an hour will do the work of about 1 1/3 horses. The kilowatt, whatever it may be, is now regarded as the basic "raw material" of this universe in which man finds himself. In learning to use it, even to the limited extent it has already been mastered, man has grasped a tool that gives him a freedom from the limitations of

time and space which no other force or instrument could confer upon him. In the words of President Hoover, "Mankind never before has grasped such a tool."

"Since the invention of the steam engine," says a recent government document, "the burden of the world's work has been lifted from the backs of men and placed upon machines driven by power generated by the burning of fuels. Not, however, until energy had been made mobile by means of electric transmission, was the possibility of man's emancipation from the treadmill realized. He must, of course, continue to labor, but he is now the operator of machines instead of being the primary source of power." [1]

The outstanding fact of our time is that the 45,500,000 or more Americans in gainful occupations are in truth equivalent to a working force of between 600,000,000 and 900,000,000 men[2].

American prosperity is, of course, the result of that great enhancement of the working capacity of the people

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[1] Glover, Nathan W., Chief Hydraulic Engineer, U. S. Geological Survey.

[2] A conservative estimate of the work done in one year by all kinds of mechanical prime movers and work animals on farms in terms of man hours of labor would give a total, equivalent to the labor of 637,750,000 men working 10 hours per day 365 days a year. In this estimate the kilowatt-hour is considered to be the equivalent of 14 hours of man labor. The estimated output of energy in the United States in a year is computed to be as follows, translated into equivalent number of men working ten hours a day, 365 days a year:

Output of electricity by public utility power plants	337,880,000 men
Work done by railroads	127,000,000 men
Work done in agriculture	73,070,000 men
Work done by manufacturers	70,000,000 men
Mines and quarries	17,600,000 men
Work done by automobiles	12,200,000 men
	637,750,000 men

Obviously this is a low estimate. It excludes the work done by the by scientists, inventors and engineers, whose efforts and results have been organized and applied by leaders of business and finance.

THE RECENT HISTORY OF POWER SUPPLY

Ever since 1850, the power at the command of the American people has been increasing at a remarkable rate. From the middle of the 19th century to the end of the first decade of the 20th, the population of the United States increased fourfold, while capacity for generation of power usable in agriculture, mining, transportation and manufacturing, was multiplied almost twelve times.

This, naturally, represented tremendous progress. But the power supply of the nineteenth century and the early years of our own century was not *distributable* power. That is the important difference between the power supply of today and the power supply of yesterday. Steam power had to be used where it was generated. It could be transmitted no further than the length of the leather transmission belt. Electric power, likewise, although it could be transmitted from one end to the other of a single community, could not be transmitted any more widely than that, in its early days. The consequence was that both steam power and early electric power caused concentration of industry in the vicinity in which the power was available. It was characteristic of electric power, in particular, that it could be delivered cheaply only to a compact and relatively congested population. Where population was sparse or communities remote, the electric power supply was proportionately inadequate for industrial development.

In fact, the early application of electric power to industry simply added force to the trends which were concentrating industry, population and wealth in great urban centers into which food and raw materials for manufacture were delivered in ever increasing volume by the railway network, which continued to spread very rapidly until about the year 1907. Until the period 1910-1912 electric power was only another centralizing influence.

THE RELEASE OF POWER FROM CONFINEMENT

It was not until about 1910-1912 that it became feasible to deliver this all-important element of power to virtually any place where it was needed or where a use could be found for it. The period 1910-1912 witnessed significant changes in the nature of America's power supply which were profoundly to affect our industrial civilization. Until that time man had to place his machines where he could obtain the power to operate them; after that time we find him the operator of machines *wherever* he chooses to use the machines.

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prime movers of ships, boats, airplanes, etc. One-half of the energy available to America and consumed in industries and daily life is utilized in the direct application of heat, without conversion into mechanical or electrical energy. That is also excluded. The output of energy by automobile engines is purposely underestimated here, because the automobile and truck are credited only with an amount of work done in performance of passenger miles and ton miles of service on a basis comparable to the work done by railroads, whereas in fact the greater amount of energy actually consumed by automobiles is for purposes of pleasure and recreation. It is probable that the energy output of automobile engines is in fact equivalent in man labor to the work of three or four hundred million men working ten hours per day, 365 days a year.

Great business and social shifts are bound to follow such a fundamental change in the character of power supply.

One of the first men to grasp the possibilities and significance of widespread power distribution was the late Guy E. Tripp, chairman of the board of the Westinghouse Electric Manufacturing Company. It was not until 1926 that Mr. Tripp, despite his unusual opportunities for observing, was prepared to make a public statement of his faith in the future of mobile, widely distributed electric power, which now seems to be assured to the people of the United States. Reviewing the development and enrichment of America from the Colonial era, he recalled that the working man, unaided by mechanical power, could at best hope for a bare existence, and was fortunate indeed if he did not end his days in the alms house. Mr. Tripp did not indulge in any lyric outburst of praise for what had been accomplished in our first 135 years of national progress. He was sober minded over the past, but hopeful of the future. He recalled to his audience in 1926 some of the questions which earnest thinkers and forward-looking statesmen were asking during the first years of this century:

"Is this progress to be along the same lines followed during the past century?

"And if so, will the evils of our times continue to grow along with the good?

"Will our cities grow ever larger, and larger? Our streets more congested? Our slums more crowded?

"Are our workmen to become more and more dependent

upon highly specialized jobs and increasingly at the mercy of trade conditions?

"Is the drain from our rural districts to continue?

"Is the position of our farmers to grow more and more unsatisfactory?

"Are they to be the hewers of wood and drawers of water for those who find relief from manual labor by the use of power driven machinery?

"Are the interests of the various sections of our country to become more and more diverse?

"Are the social, economic and political cleavages between the city and country to grow broader and deeper?

"If so, will our political institutions continue to flourish?

"Will not our industrial and commercial structure prove eventually too heavy for its agricultural foundation and give rise to radical innovations?"

These, indeed, were the discomforting prospects which actually faced America in the early years of the twentieth century. And, so far as was then apparent, the direction of events gave ample ground for pessimism. The fortunate and opportune development of two new agencies of progress turned our course into more hopeful directions. Mr. Tripp said of these:

"Were conditions today (1926) what they were in, say 1910, it would be a far-sighted man indeed who could sincerely give optimistic answers to these questions. All things at that time seemed tending in the direction of centralization, concentration and specialization. There were few signs that the tide might turn in some other direction. Today, however, matters appear in much more hopeful state." And these are the reasons he gave:

First, the creation of a network of over 100,000 miles of high voltage electric power lines, distributing electrical energy over a large part of the United States, making adequate power supply an asset not only of the big cities, but available at almost any point on the map.

Second, improved transportation—faster rail service, the automobile and the highway systems, all of which made transportation flexible and faster.

DECENTRALIZING INFLUENCES AT WORK

Just as the construction of the railway network made possible the typical American civilization of the latter half of the 19th century, so the construction of the network of power lines in the United States heralds the typical civilization of the 20th century. It is indicative of the swift tempo of our day that the spread of the network of power lines is now proceeding at a much more rapid rate than the construction of rail lines in the early years of railway empire building. In the seven years 1921-1927 inclusive, the sum of $1,091,774,405 was spent for electric transmission lines. The value of all the railway operating property in the United States after three quarters of a century was only $11,244,852,000.

In the first thirty years of railway building only a little over 30,000 miles of line were constructed. During the seven years previous to January 1st, 1929, 50,000 miles of electric transmission lines were built.

In the history of the electrified civilization now taking shape before our eyes, the year 1910 corresponds

roughly with the year 1830 in the history of the railway, because the development of the electric industry through the first decade of the twentieth century was on lines precisely similar to the evolution of the factory-railway system which was ushered into the world when Watt converted the steam mine pump into a manufacturing prime mover, and Stephenson brought the railway out of the coal pits and made it the main highway of modern commerce. These were centralizing influences; and likewise, until 1910, the electrical industry harmonized with the centralizing tendencies of the industrial and transportation organization in which it had grown up.

THE CONQUEST OF SPACE AND TIME

The America of 1910-1912 and 1929 are vastly different.

It is scarcely possible for us in 1929 to weigh impartially and fully the factors which have been at work, and to evaluate exactly the tremendous changes apparent in our economic and social life. But at least a hint of the ultimate economic effects of the employment of this unique tool, electric power, generated and transmitted so that it is available anywhere at any time, may be obtained from the well-known classifications of time values and place values which have long been important in economic theory and discussion.

Traveling at 186,000 miles per second, it is evident that distributable electric power, as compared with energy obtained by movements of men, animals or fuel, creates new yard sticks of value and relieves the business of the nation from a great burden of inventories and interest charges which would have to be borne under conditions in which vastly greater amounts of time were consumed in industrial processes.

Furthermore, because electric power can now be transmitted to any spot where work is to be performed, it is evident that pre-existing place values of all kinds are profoundly affected and the activities of the nation will be relieved in an ever increasing degree of limitations of location and physical geography, and of a great amount of economic rent, whether expressed in land values or in other less apparent charges, due to location.

The kind of power supply which brings about these advantageous conditions, and new standards of value, is provided only by the electrical power industry under conditions which have arisen in comparatively recent years.[1]

It was not until it became possible to transmit electricity over considerable distances, and not until it had been demonstrated that it was profitable to do so, because work could be found for widely distributed power, that an adequate power supply could be made available over widespread areas, irrespective of population density. Then it was that electric power became an active force for decentralizing industry, thus reversing the prevailing currents which had characterized business enterprise since the industrial revolution of 18th Century England.

This is the unique characteristic of the American civilization now taking shape. How the foundation of which it is reared—the widespread distribution of power—was arrived at will be seen from a recital of the formation of the first organization which took up definitely the task of diffusing electric power over the countryside.

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[1] The special characteristics of electric power which enable it to accelerate these decentralizing tendencies are summed up by Owen D. Young as mobility, divisibility, applicability and reliability. Commenting editorially on these characteristics, the Chicago Tribune remarks:

"Concentrated power marks the steam driven machinery of the last century, and the industrial revolution, the factory system, the great congested city of this day rose around those power machines. Distributive power, which also may be concentrated at will, marks the electric power of tomorrow, and the new civilization may well develop from it. . . . . . Small units of power consumption will be economical. The farmer will tap the line for a few horse power. The manufacturer will draw off power to run a great production plant. When super power lines enforce the principle that power need not be used on the site of its production the great cities can decentralize, at least in some measure, and factories may produce in smaller units. The small town may come again. This is what Owen D. Young means by the mobility and divisibility of electric power. New ways of life will come of it."

Dr. Glenn Frank, president of the University of Wisconsin, has drawn this contrast: "In a machine civilization created by steam power, the worker must go to the power, but in a machine civilization created by electric power, the power can be taken to the worker; and that is a revolutionary fact which means that when we say 'machine civilization' in terms of 1950, we may be dealing with a machine civilization that is as different as imagination can conceive from the machine civilization which began when James Watt first harnessed the expansive power of steam to the processes of production."

II.

TRAIL BLAZERS OF THE NEW FRONTIER

In the year 1910 an experiment in electric supply was tried, which was to demonstrate the feasibility of widespread distribution of power, and to give commercial and economic validity to the latest technical advances in the art of electric power transmission. A number of inadequate small generating plants serving small towns in Lake County, Illinois, were shut down and replaced by transmission line service from a plant centrally located.[1] The results more than justified the experiment. By 1912 it had shown enough success to justify the formation of the Middle West Utilities System, to promote the same idea in a number of other districts. Similar organizations were subsequently formed, with the result that today a distinguishing feature of America's electric power supply is its availability at virtually any point on the map.

The organization of such a system to distribute to hundreds of small communities the sort of electrical service available theretofore only to great metropolitan centers, was supremely fortunate and opportune and in keeping with the needs of its time. It was the result of discovery, experiment and foresight. The full importance of that discovery, however, is just now being revealed. Even the founders of the system visioned it only in part.

What was this discovery? The advantages of concentrated production of electrical power on a large scale has been understood for a long time. The possibilities of generating electricity in great central stations were established with the installation of the first steam turbine electrical generating plant at the Fisk Street Station in Chicago in 1903. That was the critical date in the history of metropolitan electric service, because the reciprocating steam engine had reached the limit of its potentialities in power generation near the dawn of the 20th century, and concentrated power production had encountered the law of diminishing returns before the steam turbine came upon the scene to initiate a new order of things.

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[1] "We selected for this experiment in 1910, a group of twenty-two little towns well back from the lake shore suburban area, with populations of 300 and up. It was probably the poorest prospect for centralized electrical operation in all of my subsequent experience.

"Ten of these towns had electric service of a sort, but only at night, locally supplied by little plants that were one jump ahead of the sheriff. The other twelve towns and the intervening farms had no electric service whatever.

"We bought the little plants of the ten night service towns. We then built transmission lines, centralized the production of current for the territory in one plant near Lake Michigan, and shut down the little plants. Now, mark the results in service.

"Within two years all but two of those little villages and towns, and 125 farms, were getting full 24-hour electric service: 24-hour service for the ten towns which previously had only night service: 24-hour service for the ten towns and 125 farms which previously had no service at all. . . . .

"The net results of this experiment, therefore, were: 24-hour service instead of night service for a population of about 14,000 people, and 24-hour service instead of none at all for a village and farm population of 9,000, all at lower rates than any part of the territory had previously enjoyed; also, the establishment of financial credit for further development that would have been impossible under previous conditions.

"This Lake County experiment was an important factor in opening up an entirely new conception of electric light and power possibilities, especially in suburban, semi-rural and wholly rural areas. . . . .

"What was done in Lake County is exactly what has been done throughout the country in recent years on an immensely larger scale; and speaking broadly, the operating results and the benefits to users of the service have been identical, assisted, of course, by coincident improvements in the art. . . . .

"The Lake County experiment was repeated in other parts of Illinois on a larger scale. Then we began to see the picture in terms of wide territorial development, even to including an entire state in one system."—from "Twenty-Five Years of Electric Power," an address by Samuel Insull before The Electric Association, Chicago, November 17, 1927.

Progress in the transmission of electricity over increasing distances was proceeding at a fairly constant rate, as scientific research was greatly adding to the store of electrical knowledge.

The unique contribution of the Middle West Utilities System to this chain of events leading up to our present stage of electrified civilization, came from an appreciation of the need of the small communities and the countryside for electrical service comparable to that available in the great cities.

It was not enough to prove that electricity could be generated on a large scale, that it could be transmitted fifty or one hundred miles, or that it was technically advantageous to connect up a large number of separate distributing systems. It had also to be proved that such a system would find enough work to do, or create enough work to do in the communities it served, to achieve commercial success. It had to be commercially successful if it was to be successful as a public service.

The founders of the Middle West Utilities System did that. They were the first to do it, and armed with the experience thus gained, the same principles have been applied on a constantly increasing scale until nearly 4,000

communities in twenty-nine states, with a population of 6,000,000 people, are now served by its operating entities, in accordance with the principles worked out in the first great technical and social experiment upon which the policies of the System have been based.

THE ERA OF DISTRIBUTABLE POWER

These principles are now, of course, the common property of the American people. They are being applied in every part of the country by the large corporate organizations which are in effect reorganizing the life of America by giving to every nook and corner of this country equal access to energy, the primary requisite of all civilization.

Quality and degree of civilization is now and always has been determined by the command of energy in some form, whether in abundance of food supplies, fertility of soil, the service of slaves, work animals, steam engines, gasoline motors or electrically driven machinery. The unique quality of the civilization now budding in America is due to the fact that electrical energy, under its new conditions of universal distribution and availability, is converting the ideal of equality of opportunity into concrete business fact wherever men live, from the Atlantic to the Pacific, from the Lakes to the Gulf.

Our approach to this physical realization of the equalitarian ideal in the last fifteen years is the reason why we have grown optimistic in the face of the questions raised by Mr. Tripp in his discussion of America's prospects. It was natural that Americans should be an optimistic people throughout the 19th century, despite the fact that their economic and social evolution was proceeding along the same lines which had led old world civilizations into the conditions of centralized power, concentrated wealth, and the mobilization of vast masses of population in cities and fertile valleys—conditions which always resulted in poverty for the great masses of men.

In America, however, as long as the Western frontier was a safety valve for the energies of the people, they naturally did not feel the pinch to which every statesman and thinker looked forward with misgivings.

THE ORIGINAL AMERICAN FRONTIER

While the free lands held out the bold and hardy had always the ready means by which to better their estates. When they pulled up stakes they not only carved out new homes for themselves, but created economic breathing space for those left behind. As they developed the rich wealth of a virgin continent, they diverted back to the East, to the crowded cities of the seaboard, and to the teeming millions of industrial Europe, ever swelling streams of cheap food stuffs, fibres, lumber, metals base and precious, cheap fuels and oils yielded from the bosom of North America to light the lamps of the herded millions of the far East.

For three centuries Americans went West. Never was there such a march in magnitude or dramatic quality. It is beyond the descriptive powers of poet and artist, who can hope at best to seize upon some little fragment here and there. For thousands of years school boys will read of the petty tribal warfare under the walls of Troy, for that is perhaps as big a theme as human imagination can cover comprehensively. Our own Odyssey from Jamestown and Plymouth Rock to San Francisco demands an Iliad every ten miles along the way. Daniel Boone is an epic all by himself. The covered wagon is a story of decades, hardly matched by the wandering of the nations in the first five centuries of the Christian era. When we come to the transcontinental gallop of the Iron Horse, the elder arts throw up the sponge.

In 1790 the population center of the United States reached a point 23 miles east of Baltimore, Maryland. Mile by mile, 40 miles in one decade, 80 miles in another, it crept westward until 1910 it rested in the city of Bloomington, Indiana, 562.2 miles west of its location 120 years before.

THE MOVEMENT CITYWARD

As population moved west the economic system by which that population lived was being transformed behind the frontier even more rapidly than the frontier was pushing it forward.

As the lands were cleared and trails opened, the crossroads general store and then the market town sprang up.

But this agricultural and market town civilization was but a fleeting phase. After 1860 groves of factory chimneys appeared as if to compensate for the vanishing forest. Americans were moving cityward as they were moving westward, and ere long the trek to town surpassed in volume the quest for free lands under the setting sun.

From the rural colonial beginnings we had reached in 1910 a concentration of population which had placed 45.8% of our people in towns with more than 2,500 population, 37% in cities of more than 10,000. As the frontier advanced the industries, which had grown up to serve and be nourished by the farms and trade of a rapidly expanding agriculture, centered more and more in rapidly growing cities which grew up at points where the railroads connected with or crossed the older water routes, or at the intersections of old trails where various lines of the great western migrations had crossed.

Chicago, St. Louis, Cincinnati and Kansas City flourished at points where the natural waterways formed junctions or "jumping off places" for westward migration—the lines of which were being rapidly trailed by the railroads, reaching further and further west for freights. West of the Mississippi, wherever a railroad seeking the Pacific crossed a cattle trail over which the great herds moved from South to North in search of water and fresh grass, a cattle town sprang up—a town which later became a packing center, as the expansion of the railways produced simultaneous concentrations of wealth and industry in the larger cities to the East and initiated new concentrations of industries and people along the westward routes. In 1889 the march to free lands came to an end, because Oklahoma was the virtual end of mass homesteading.

THE EMERGENCE OF THE NEW FRONTIER

It was nearly 20 years later, about 1910, before economists and political thinkers generally began to note a few of the effects of the vanished frontier upon a people long accustomed to such an outlet.[1]

It was at this time that a new frontier revealed itself—an internal frontier, consisting of great areas of neglected country between the cities. Much of it was settled for over a century, much of it lay within the boundaries of the original thirteen states, but it was still a frontier in the sense that it was outside of the advanced economic possibilities and modes of life which America had developed in its concentrated centers of population.

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[1] It is significant to place side by side two statements quoted in Frederick Jackson Turner's "The Frontier in American History." One is a statement by the Superintendent of the Census of 1890:

"Up to and including 1880 the country had a frontier of settlement but at present the unsettled area has been so broken into by isolated bodies of settlement that there can hardly be said to be a frontier line. In the discussion of its extent, its westward movement, etc., it can not, therefore, any longer have a place in the census reports."

The other is a quotation from Grund's "Americans," written about a hundred years ago:

"It appears then that the universal disposition of Americans to emigrate to the western wilderness, in order to enlarge their dominion over inanimate nature, is the actual result of an expansive power which is inherent in them, and which by continually agitating all classes of society is constantly throwing a large portion of the whole population on the extreme confines of the State, in order to gain space for its development. Hardly is a new State or Territory formed before the same principle manifests itself again and gives rise to a further emigration; and so is it destined to go on until a physical barrier must finally obstruct its progress."

The westward and cityward movements had left these great gaps of scantily developed country dotted by thousands of small communities. These areas remained in the first stages of general store and market town business life.

Upon its formation in 1912, the Middle West Utilities System began weaving a web of power lines over this new frontier. This process of linking the scattered villages and towns by transmission lines and energizing these scattered communities from large generating stations of ever increasing efficiency, has been continuous. It has proved commercially successful. And there has been confirmation of the original belief that new industries would advance upon this new American frontier and fill in the open spaces between the populous centers which were formed during the great westward sweep of settlers and railroads.

Engineers, economists and business men now perceive that when the scattered communities of our new frontier are given a power service comparable to that of the cities, they are relieved of the handicaps which previously diverted the industrial activities from small communities to the centers of population. The adequately electrified community can accommodate industries which seek a new location. Thus electric power has blazed the trail to the new frontier for the factory.

There were 13,268 incorporated communities in 1920 with less than 2,500 population, and 42,073,705 persons or 39.8% of the entire population of the United States in 1920 lived outside incorporated places on farms or in tiny communities, the trade of which is, of necessity, carried on for the most part in larger communities.

In 1912 hundreds of these communities were less industrial and had a less diversified business life than they had enjoyed twenty, thirty or fifty years before. The small handicrafts, the local foundry, wagon shop, flour mill and other such industries had been largely displaced by the flood of cheaper and sometimes better goods from large scale factories in the greater towns.

The small industrial plants scattered throughout the countryside, a large part of them located on small intermittent water powers, with the machinery geared directly to the ancient water wheel, had disappeared or were going out of existence when the centralizing forces of the steam engine and railroad attained their maximum effectiveness, about 1907. This process is still going on side by side with an expansion of highly modern industrial activities out to the small communities. Simultaneously with the building of hundreds of modern factories in the smaller communities we had and still have the closing down of many primitive small scale plants and industries, so that mere statistics very frequently give the impression of an increasing concentration of industry, where the most significant trend is in the other direction.

The wiping out of the older decentralized industry may for the time being surpass in volume the growth of the new decentralization of more advanced industry. It is in these vast areas and these communities outside of the metropolitan centers, that the most interesting and characteristic industrial and social changes are now taking place. It is in these communities that the future of America is very largely being forged.[1] This is America's New Frontier.

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[1] While the industrial decentralization based on diffused power supply does not of itself imply accompanying decentralization of population, it is interesting to take notice of an authoritative view that population, too, is approaching a period of decentralization. The successive shifts of population in America are pictured by Lewis Mumford as a series of four migrations—"the first migration that cleared the land west of the Alleghenies and opened the continent, the work of the land pioneer; the second migration, that worked over this fabric a new pattern of factories, railroads, and dingy industrial towns, the bequest of the industrial pioneer; and finally—and this brings us down to the present period—there is the America of the third migration, the flow of men and materials into our financial centers, the cities where buildings and profits leap upward in riotous pyramids. These three migrations have covered the continent and knitted together its present framework." (*Survey Graphic,* May 1925.)

The filling up of the "open spaces" is called "The Fourth Migration," which Mr. Mumford ascribes to the automobile, telephone and radio, and the electrical transmission line. "The technological revolution that has taken place during the last thirty years . . . . has made the existing lay-out of cities and the existing distribution of population out of square with our new opportunities."

A similar trend is noted by Baker Brownell in his "The New Universe": "With new communications, with facilities of transport much improved, with the social prestige of the city somewhat declining, the great town as a center of enjoyments is no longer so essential as it was. City life is virtually extended now to many rural districts and a further growth in that direction is more than probable. . . . Men will be more concerned in joining 'life' and business than they are today. They will want consumption values or enjoyment directly in productive work. They will refuse the sharp dichotomy between their pleasures and their job; and will return in some degree to the land and natural stabilities to which man is physically and mentally adapted. In the small town city and country will eventually be joined."

III.

THE SMALL TOWN

The small town is the pivot of the reorganization of America now in process. Let us look at the American small town from the standpoint of modern science and technology. It will give us a new point of view and we will behold a new picture, because the small town suffers today from psychological handicaps which derive from history and emotional habits inherited from the past. The backwardness of our so-called modernistic literature and the failure of modern writers to keep abreast of the developments of science and engineering is revealed by the fact that contemporary literature and social thought reveal but scant recognition that electrical power has been rejuvenating and enriching the life of the small community, faster than that of the great urban centers.

We have produced in America a considerable literature derogatory of the small community. The sentimental 18th Century attitude toward village life as reflected in Goldsmith's *Deserted Village* or Gray's *Elegy in a Country Church Yard,* has been succeeded by the scoffing of Sinclair Lewis and the diatribes of Henry L. Mencken, a literature as grotesquely out of tune with the dominant trend of the new technology of civilization as the 18th Century idealism. Both schools are anachronisms, but others are equally devoid of understanding. Our whole complex of commercial and political thought relegates the small community to a position of less importance than present day conditions warrant. First of all the essence of the supposed backwardness of the small town was its remoteness, but this is largely historical and the space annihilating quality of electrical power has been the foremost factor in its elimination.

POPULATION AN OBSOLETE MEASUREMENT

Much of the misconception of the importance of the small town comes from our habit of ranking nations, states, cities and towns by their population. This is a direct heritage from the ages in which the wealth and the culture of a nation or city were directly in proportion to its man power, because man power was the source of practically all wealth, and the amount of wealth a community could accumulate over and above its immediate needs for food, shelter and raiment, and the leisure and culture that was possible for the "upper classes," was determined by the number of human workers available.

Christopher Columbus and the explorers who followed him were chagrined when they stumbled upon a sparsely populated continent, stored with virgin resources of mine, soil and forest. They were seeking the "wealth of the Indies"— a glittering surface of wealth and leisure for a microscopic few based upon the unremitting toil of myriads of herded helots. We are slowly growing wiser. Modern economics realizes that the wealth of the Indies represents an average purchasing power of less than

$20.00 per year for the 300 millions on India's Coral Strand. American exporters know that 6,000,000 Australians or 9,000,000 Canadians are more valuable to them than the indeterminate hundreds of millions huddled in the teeming valleys of China.

One may read every day in foreign trade discussion that from 70 to 90% of the population of Russia, China or India must toil in the fields while fifteen men in America can produce the necessities of life for 100 persons, giving the remainder of the working population opportunity to create luxuries, provide recreation and culture and build machinery and structures for the further enhancement of the nation's productive power.

HOW BIG IS A TOWN?

It is time to apply some of this knowledge to America and to take cognizance of it when we make comparisons between American communities. Comparison by population is obsolete. In the age of electrical power usable anywhere, any time, available man power no longer sets a limit to the wealth and buying power of a village.

The idea that the choicest markets are to be found in the dense metropolitan swarms is also the result of intellectual laziness.

The Middle West Utilities System, for instance, serves nearly 4000 small communities with a population of about 6,000,000. A population of this size contains about 2,400,000 people employed in gainful occupations. The power distributed to these communities is equivalent to the working capacity of over 11,000,000 able bodied men working 365 days the year round.

But it may be urged that electric power is also distributed to the people of the metropolitan districts in equal or greater measure, so, after all, comparison by population is justifiable. Superficially plausible, this thesis will not stand analysis.

NET GAINS IN POWER SUPPLY

Electric power used in small communities goes directly into net gains of productivity and better living in a degree not equalled in the great cities where a large part of the power consumed is used in overcoming the handicaps of congested habitation. The massing of great populations on limited areas[1] automatically creates conditions which must be overcome by the employment of a large percent of the available power and human labor of great communities.

To put it in the raw, city dwellers must pay heavily in labor, power and money merely to get out of each other's way. Probably the most familiar aspect of this situation is the high cost of distributing food stuffs within metropolitan areas. It is no unusual thing for a box of strawberries to be delivered to Chicago from Milan, Tennessee, at a cost of 8 cents per quart, which includes all that the land owners, growers and pickers received, plus the railroad freight and refrigeration costs. By the time the consumer gets the quart box its price has risen to 35 cents. Yet a margin of 27 cents as a rule represents no exorbitant profits between the freight train and the dinner table but on the contrary is the price of a large number of services rendered, many of which are made necessary by the physical conditions resulting from population density. This homely instance pictures on a small scale what happens with regard to urban labor and to electric power generated and distributed in great cities.

The per capita use of electricity in such districts is very high, but power must be diverted to subways, elevateds, street railways, elevators, pumping water to great heights in tall buildings and many other services which are not required where people are less crowded. Electric traction, mostly in metropolitan cities, consumes over 11 billion kilowatt-hours of electric energy yearly. This is a sizeable portion of the total central station output of 87 billion kilowatt-hours in 1928. Tall buildings, cavernous streets, dark rooms demand an enormous amount of day time lighting. Superficially, the higher per capita consumption of electricity in cities would seem to indicate a higher standard of living than that in small communities with a lower per capita consumption, but a large part of the urban use of electricity is required merely to level up the city dweller's plane of living to that already enjoyed by the inhabitant of the smaller community without recourse to, or the demand for, electrical or mechanical power.

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[1] Of the 1,903,000,000 acres of land in the United States, only 10,000,000 acres are occupied by cities and villages. (Year Book of Department of Agriculture, 1923; chapter on "Land Utilization"). In other words, approximately eighty percent of the population lives on one-half of one percent of the land.

A book might be written on the greater efficiency from the human standpoint of 1,000 kilowatt-hours of electric energy consumed in a town of 2500 population than that of 1,000 kilowatt-hours used in any city of 5,000,000 people.

WHAT IS WEALTH?

The fallacy of comparisons of communities by relative population figures extends to and permeates many of the comparisons of the wealth of communities of varying size. In the absolute sense, of course, great transportation systems, water works, sewer systems and other costly apparatus of metropolitan life are wealth, and they figure in all the estimates of national wealth. The great skyscrapers, the construction of which is a direct consequence of concentrated population and the high ground values which result from such density, are an instance of hundreds of millions of dollars of absolute wealth which cannot be accurately used in calculating the relative wealth of large and small communities, because the smaller communities, having no need for such construction, and already enjoying every benefit that they can confer upon the city dweller, are disparaged if that sort of wealth be counted in comparisons.

Many things which are an absolute necessity in the city are luxuries in a small community. Street lighting in the great cities is absolutely essential and increasingly a defensive measure against the sinister forces of the criminal underworld. In the smaller communities it is merely a convenience. We are just beginning to light our rural highways. Michigan now has about 375 miles of highway lighting at night, making fast night travel easier for motorists. Electric power expended and capital invested in highway lighting confers another good upon the outlying regions which is not the case in the metropolis. Construction of the power lines to supply highway lighting systems facilitates the electrification of farms, and the direct benefits of rural electrification accrue in greater measures to the smaller community than to the distant metropolis.

THE COST OF CONGESTION

A large part of the "speed" of city life consists in frantic efforts to get to and from the job. In Chicago 29% of all the electricity generated is required for railway and traction use. While, of course, this is a productive process and leads directly to the creation of economic values, it is also a cost of production which appears to increase at a much greater ratio than population.

The cross hauling of human passengers within great cities is in some respects similar to the cross hauling of freight in the country at large, which is necessitated by the concentration of industries in the great cities.

It appears that the amount of car riding in New York increased about 55% in a period in which population gained less than 15%. In that we have an explanation of the phenomenon which has caused so much discussion in that great city, which finds that the more subways it builds the greater is the demand for subway transportation.

The diversion of a large part of traffic from rail lines to motor vehicles in like manner resulted, not in relief, but in intensification of street congestion.

The American Electric Railway Association estimates that delays in street traffic in New York result in an annual loss of $540,000,000 or $28,000,000 more than the city budget, and a large part of the city budget is a reflection in dollars and cents of the costs generated by massed population.

Owen D. Young, Chairman of the Board of the General Electric Company, in commenting on the New York situation has declared that the people of New York could better afford to buy property on Fifth Avenue and raze the buildings, for parking places.

Traffic during the rush hours moving north out of the downtown district of Manhattan Island has an average speed of only four miles per hour. In discussing means of traffic relief Mayor Walker of New York has estimated that more than a half billion of dollars is necessary in the immediate future.

Back of all these figures in dollars and cents is a pyramiding of a demand for both human labor and mechanical power, caused by the growth of population

upon limited areas. Much of the power applied in great centers of population is electrical, and therefore electrical power put to work in a small town profits the people more than the same amount of electrical energy used in a great metropolis.

PROBLEMS OF WATER SUPPLY

A striking example of population congestion increasing costs of living at a greater rate than the increase of population, is offered by the problems of water supply which confront all great cities. In fact, far seeing engineers find that the difficulty of supplying water would fix the ultimate limit of the size of cities, even if no other force were at work.[1]

The water consumption of a community increases at a greater rate than that at which the population grows. A town with a growth of thirty per cent of population in ten years will use 40% more water at the end of that period. Not only consumption but wastage increases as population grows more dense.

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[1] It is probable that the great metropolitan centers will reach their size limits in respect to water supply before they encounter any limit caused by industrial competition with the small town. The industrial development of small towns does not necessarily imply an accompanying decline of the big cities. It does serve, of course, as a preventive of excessive big-city congestion. The actual benefits which the big cities may derive from the development of their hinterland are well expressed in the following comment by Royal F. Munger, financial editor of the Chicago Daily News, in the April 24, 1929, issue of that newspaper:

"Will such a trend operate to the detriment of Chicago and other great cities? On the contrary, the utility men themselves are making preparations, in the scope of their construction, for such cities as the world has never seen. Industrialized small towns, within easy reach of larger centers, offer through transportation improvements a growth possibility as yet only visioned."

Some of the greatest engineering works of man have resulted from efforts to cope with this problem. The ancient world, which could construct great public works without imposing capital charges upon them, because it could use slave labor and take a half century or so for the job, was perhaps better qualified to cope with urban thirst than our world, in which men must be induced to labor and to save by hopes of gain. Our system of public and private finance is, in the last analysis, the modern substitute for the lash, which inspired the builders of ancient aqueducts and canals; but if the labor for such work is to be paid wages, capital charges must be imposed for long periods upon the communities which they are to serve. The larger centers of population must incorporate such charges in their costs of living and in their costs of industrial production.[1]

To add to available water supply in the city of Boston, a 13 mile tunnel and aqueduct is being blasted through solid rock from the Ware River to the Watchusett reservoir, which at present serves Worcester and the Boston metropolitan district. Eleven feet wide and nearly 13 feet high, this aqueduct will deliver nearly 35,000,000 gallons daily. Ten years will be needed for the completion of the undertaking, at an estimated cost of over $100,000,000.

The city of Los Angeles proposes, after the expenditure of $125,000,000 by the United States Government in the construction of a great dam in Black Canyon and other works, to lift 2000 cubic feet of water per second over intervening hills more than 1500 feet high, and to conduct water from the Colorado River over 150 miles to the coastal plain of the Pacific. This will require more than half as much electric power as was generated by the entire electric light and power industry of the United States in 1902.

Thus in many respects—water supply, transportation, elevators and other inevitable accompaniments of congestion—a great part of the big city's power supply is diverted to functions which are not required in the small community.

When electric power is introduced into the smaller community, it either multiplies the productivity of all the workers in the community, thereby raising the average purchasing power; or it may displace some of them and cause their removal to the cities. The latter effect, while not raising the total output of the community, nevertheless increases the average buying power of those remaining.

Hence, stationary or decreasing population existing side by side with increasing prosperity is quite logical in our smaller communities.[1] The great cities have been gaining

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[1] Statistics cited in "Urban Land Economics" (Dorau and Hinman) show that *per capita* taxation increases as the size of a city increases.

[1] While the cityward movement of population persists, the only gain in number of industrial wage earners is found in towns of under 10,000. The smallest loss is shown by towns of 10,000 to 25,000. This is a striking illustration of the independence of industrial movements and population movements.

"The Department of Agriculture," it is observed in *Recent Economic Changes,* "has made us familiar with the migration of farmers from country to city; we know less of the movement which has carried in population, to some extent, at the expense of the population of small communities, but not at the expense of the small communities' economic prosperity. Before the coming of distributable electric power, however, the big city's gains were at the expense of the small town's economic prosperity.

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manufacturing into the country. Between 1919 and 1925, while the 25 largest cities in the country lost 326,800 wage earners, about 12 per cent of the average number employed, the rural area (all area not included in communities having a population of 10,000 inhabitants) gained 55,204 wage earners. Nor is this decrease limited to the larger cities. Cities between 100,000 and 250,000 population lost even more heavily, 14 per cent of their wage earners; communities between 25,000 and 100,000 lost 11 per cent, and those between 10,000 and 25,000 lost 8 per cent of their wage earners."

Following are the figures for the United States as a whole, as published in *Recent Economic Changes:*

Size of Community	No. of Com.	1919		1925		
		Number of Wage Earners	Per Cent of Total	Number of Wage Earners	Per Cent of Total	Per Cent Change 1919 to 1925
Over 250,000	25	2,763,494	30.5	2,436,694	29.1	—11.8
100,000-250,000	43	1,016,388	11.2	873,813	10.4	—14.1
25,000-100,000	215	1,637,786	18.1	1,461,653	17.4	—10.8
10,000-25,000	456	954,600	10.5	874,749	10.5	— 7.8
Remainder		2,678,561	29.7	2,733,765	32.6	+ 2.1
Total U. S.		9,050,829		8,380,674		— 7.4

IV.

INDUSTRY'S INTEREST IN THE NEW FRONTIER

Undoubtedly, the mounting costs of urban living, which are bound to be reflected in the production costs of industry, are largely responsible for the unmistakable movement of some of the most advanced of American industries to the smaller communities.[1] Lower land costs, lower labor costs, better living and working conditions and lessening of fatigue are some of the more obvious considerations.

However, there are other causes quite as irresistible, if somewhat less direct.

The demand for style and individuality in goods, which has become such a marked characteristic of business life

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[1] The most exhaustive study so far made of factory migrations from and to communities of varying size is that conducted by the Metropolitan Life Insurance Company and published in July, 1929. Although this study according to its own statement is incomplete and weighted in favor of the metropolitan centers because it covers 90 per cent of cities of more than 150,000 population and only one third of towns under 10,000, nevertheless it shows that for the years 1926 and 1927 the balance of migration was strongly in favor of the smaller community. This is shown by the following table of factory relocations:

Section	*From Larger to Smaller Community*	*To Community of Same Size*	*From Smaller to Larger Community*
New England	113	30	67
East South Central	14	4	13
West North Central	5	13	22
Pacific	7	8	14
East North Central	81	64	65
Middle Atlantic	131	72	110
Total	351	191	291

(Size of communities not stated for West North Central, South Atlantic or Mountain states.)

The growing industrial strength of the smaller community relative to the large centers is also deducible from careful analysis of the in the last few years, has accelerated this decentralization. The more exacting demands of our highly prosperous people have caused manufacturers to alter their engineering methods to facilitate quick changes in line, form and color. Spurred by this demand for flexible production, manufacturers have discovered new principles of mass production. This change in methods within the individual factory has made it more desirable to establish and maintain plants in smaller communities.

Charles F. Kettering, Chairman of the General Motors Research Corporation, has said: "We now avoid gigantic costly special machines. We prefer to get the same result by a combination of mechanisms which can, at any time, be redistributed to other jobs without loss. That is one reason for the universal use of conveyors, which cut costs of handling by speeding up motion, yet if the process changes and a different set of machines are required, the same set of conveyors can be made equally useful for difficult handling."

FLEXIBLE MANUFACTURING PLANTS

The great automatic mechanisms, constructed to stamp out a stream of articles or parts all alike, as so many grains of wheat, are being replaced by simple machines, each machine performing some special operation, so that any one may be replaced in order to effect a change in production without impairing the usefulness of the others in the process. Plants so equipped are flexible enough to respond quickly to changes in the market. Such plants can be built for any given industry or industrial operation and they can also be split into parts and located at different points if economy dictates such location. The vogue of mere size is past in manufacturing, as management has taken to heart the lesson that mere bigness is no longer assurance of real manufacturing economy.

In his study of combination in the American bread making industry Carl L. Alsberg has made some pertinent observations as to facts which manufacturing management now recognizes as never before. He says:

"The physical factors which influence the size of a plant

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figures on the establishment of new industries, branch plants and relocations of industries employing more than one hundred persons. Plants of that size are perhaps more characteristic of the advanced sections of modern industry than plants with smaller staffs which include many purely "satellite" industries in the large centers, and antiquated industries in the smaller towns. Two hundred cases of relocations of plants employing over 100 were divided as follows: 46 to cities of over 150,000; 40 to towns of 50,000 to 149,999; 74 to towns of 10,000 to 49,999; 42 to towns of less than 10,000. 223 cases of branch plant locations were divided as follows: 70 to cities of over 150,000; 45 to towns of 50,000 to 149,999; 47 to towns of 10,000 to 49,999; 68 to towns under 10,000. 340 cases of new establishments were divided as follows: 129 to cities of over 150,000; 54 to towns of 50,000 to 149,999; 68 to towns of 10,000 to 49,999; 88 to towns under 10,000.

Industrial mortality was conspicuously greater in the larger cities according to the Metropolitan survey. Losses under the heading "Out of Business" show 78 per cent in cities over 150,000 (compared with 13.5 per cent in towns under 50,000 and 5.1 per cent in towns under 10,000). Of the losses for which the reason "moved away" is assigned 52.2 per cent were in cities over 150,000, 33.2 per cent were in towns under 50,000 and 12.9 per cent were in towns under 10,000.

The figures of the Metropolitan survey are now one and a half years old. They disclose a trend and a momentum which current industrial news as reported in the newspapers shows to be gaining.

New industries are of course being established in the larger cities, but the Metropolitan survey remarks significantly: "A country wide summary attributes the bulk of the gains to the larger cities. This is principally due to the large number of 'satellite' industries, classified in this survey as new industries, starting up in the larger cities around the established industries." Much of this establishment of new industries was in the form of food industries, necessarily locating in densely populated sections.

may be matters of machinery and processes or they may be matters of market.

"In considering the upper limit of size for machinery, using this term in its broadest sense, it must be kept in mind that the limiting factor, in the case of manufacturing requiring a number of machines in series, is that machine of the series which has the least optimum capacity.

"It does a canner of tomatoes little good to install a single tomato washing machine capable of handling ten tons per hour if the can sealing machine will handle only one ton. The can sealing is the neck of his production bottle and he will widen this neck by multiplying his can sealing units.

"With the electric motor available to the small scale manufacturer there is no reason to believe that multiplying units presents of itself any economies, while there is probably an upper limit beyond which units cannot economically be multiplied in the same plant."

The bearing of these facts upon decentralization of manufacturing processes is obvious, while the construction of highways and increasing use of motor trucks has served to equalize market conditions between large and small plants.[1] This applies not only between small communities and large cities, but between cities of considerable size. For instance, a manufacturer of shopping bags, who delivers direct by truck to retail establishments in Chicago, has declared that his location in Indianapolis is just as good from a marketing standpoint as if his plant were in Chicago itself or its industrial suburbs.

THE SMALL SUPPLEMENTARY PLANT

How the trends within the individual factory have extended outside and are transforming whole businesses, the central plant being supplemented by smaller plants, each located where it can best do its part of the whole task, has been ably discussed by E. J. Kulas, President of the Otis Steel Company:

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[1] The participation of the automobile in developing the new frontier has been strikingly similar to the part played by distributable electric power. Writing in the *Journal of Land and Public Utility Economics,* John C. Long says: "The development of America as it has resulted from the pressure of population westward is helpful toward an understanding of the growth of the automobile industry. For here, again, is a development depending upon the frontier, although this time the movement is radial rather than a pushing ahead in one direction.

"Impressed by the rapidity with which the American nation moved toward and built up the West, we have been inclined to think of that phenomenon as a wide wave of progress. It might better be considered, however, as a series of rivers rather than a broad, complete flow.

"What happened, in short, was that along certain wagon trails, canals, and railways, the pioneer pushed westward and took the country, but in between these gridiron lines of communication vast territories remained undeveloped.

"Shortly after the railways had reached the peak of their development in this country, the automobile appeared on the horizon, offering a new form of transport. Confined neither to rails nor to water, it could operate wherever there was a highway, a road, or even a clearing. Let us imagine a tract of land 40 miles square, bounded on each side by either railways or river. Before the coming of the automobile, the bulk of the population would normally be within a few miles of the lines of transport. Today any part of the square is socially and economically usable because of the automobile; it is within an hour's ride of the main lines of communication.

"It is this situation which has made the tremendous growth of the automobile economically possible. It must not be forgotten, too, that the automobile furnishes rail-less transportation. Large amounts of capital are needed by steam railways to prepare road-beds and lay rails before operations can begin. The capital needed to make a usable motor roadway for the same distance is a smaller amount. This is but one factor, but it is an important element in bringing the motor vehicle within reach of the families in the less prosperous rural regions. The steam railways could not afford to extend lines into sparsely settled territory, and the settlers in such regions could not afford to subsidize a railway extension. Transport was therefore at a minimum in regions not directly served by railways until the development of the motor vehicle brought an alternative within the scope of those with limited means. Then the one-direction frontier gave way to the radial frontier in extending land utilization."

"A few years ago," says Mr. Kulas, "the whole trend of industry was toward centralization and larger units. Today it is a matter of common knowledge that the trend is in the other direction, toward decentralization and smaller units, meaning that the natural expansion of industry today is directed into many small plants, rather than into enlargement of existing large units. The process is really one of continuous subdivision. A corporation builds a small plant at a point strategically located to perform one or more preliminary operations. The space thus released in the central plant is devoted to the expansion of another operation.

"In nearly every industry this has been accomplished by a development of what might be called independent decentralization. The growth of the small plant is a factor to be reckoned with in aggregate volume, to say nothing of its value as an indicator of change. Being small it is generally more flexible."

MAKE OR PURCHASE?

These changes in factory set-up and geographical subdivision in industries have been accompanied by another new policy. The production of all their raw materials or the manufacture of all parts and accessories of their finished products is losing favor with great corporations. If the specialized producer can now do the job more cheaply he gets the order. The Ford Motor Company is the most conspicuous instance of this. As it swung into greater production in 1928 the company contracted with outside corporations for all of its storage batteries. It went outside for its steering gear, for one-third of its wheels, all of its shock absorbers and many bodies.

Electrical energy available anywhere has been a contributing, and frequently is the decisive factor in all these innovations. The ability to ship by truck or rail from and to any point and available power supply at almost any place has made it possible for American industry to remove and remold itself at will.

The term decentralization does not mean that the large units of industrial areas are being broken up and moved out into the smaller towns. What it does mean is that the natural expansion of industry of today is directed into many smaller plants rather than into enlargements of existing big scale plants.[1] The business chief has an ever wider choice of locations with power available at any point at any time on a scale equivalent to that of the power supply of the metropolitan center. He can place one plant near raw materials, cutting costs of transportation from field, mine and forest to the factory. Other plants using semi-finished products can be placed nearer choice markets, while still other plants of his chain may be located with an eye to the workers' welfare and contentment, taxation and prices of land.[1]

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[1] At the annual meeting of the American Society of Mechanical Engineers in New York March 25, 1929 a report was presented which declared that:

"Contrary to popular impression, small concerns are shown to be managed better than large ones. The smaller concerns on the whole produce more in quantity and in dollar value per man-hour of labor."

E. W. McCullough, manager of the department of manufacture, U. S. Chamber of Commerce, recently said:

"There is no passing of the small factory equipped with modern machinery and strategically located. The day of the big inflexible plant, facing intense competition in distribution as well as production, seems to be on the wane. Already many of the newer and best managed industries are getting away from building very large units and leaning more strongly toward those commensurate with the market to be served and building them near it."

Undoubtedly the census of manufactures for 1927 reflects these movements in recording an increase in the number of manufacturing establishments from 187,224 in 1925 to 191,863 in 1927. This gain in the number of establishments in the two year period was revealed in the midst of an era of mergers and consolidations of manufacturing companies, and also followed a period in which the total number of establishments had been declining rather steadily since 1919. The new trend revealed by the latest census reflects in part a net gain of decentralization, by the outward advance of more modern and highly organized industries, over the continued concentration of more primitive industries, as previously noted.

The average manufacturing plant in America today is employing a smaller number of workers than in 1925, as the number of wage earners declined from 8,381,511 in 1925 to 8,351,257 in 1927. It is interesting that while the number of establishments was increased 2.5%, the number of wage earners was decreased by 0.4% and the horsepower used in manufacturing increased 9.01%. As practically all the gain in horsepower of prime movers in manufacturing establishments is in electric motors, using power purchased from public utilities, we have a hint of the decisive influence of electric power in this trend to smaller individual plants employing small numbers of workers per plant.

THE MOVEMENT TO THE SMALL TOWN

It is impossible to say exactly how much of the increasing subdivision of industry is due to geographical decentralization, and how much is due to the growth of small specialty manufacturing plants in large cities. But the large increase in electric horsepower employed certainly gives notice of the importance of the geographical decentralization, because the principal characteristic of small specialty manufacturing in large cities is the employment of highly skilled and specialized manual labor to make luxury wares or tools and instruments of extreme delicacy and precision.

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[1] One of the many statements which Henry Ford has made in advocating industrial decentralization is this: "Any small part entering into a finished manufactured product means a great deal of work. To make it in quantity calls for a lot of men. It is better to carry the part from the point where it can be made easiest and cheapest to the big plant where it is needed, than to transport the men. . . . Highly standardized, highly subdivided industry need no longer become concentrated in large plants. . . . A thousand or five hundred men ought to be enough in a single factory; then there would be no problem of transporting them to work or away from work, and there would be no slums or any of the other unnatural ways of living incident to the overcrowding that must take place if the workmen are to live within reasonable distances of a very large plant." On another occasion Mr. Ford observed: "Is it efficient for business to pay high land prices and high taxes in congested cities where its workers must pay exorbitant rent, when, by moving fifty miles into the country it could get low land prices, lower taxes and lower rents—and far better living conditions for its people?"

George M. Verity, president of the American Rolling Mill Company, has said: "The security of capital depends on the contentment of labor. The contentment and happiness of labor depend as much on conditions outside the factory as inside. Labor gains in respect, contentment and interest as it moves away from population congestion. Industry, for its own good, goes to small towns."

A staple newspaper story in recent years has been a catalogue of plants which have left large cities.

The New York *Telegram*, January 29, 1929, published a map of New York City showing a traffic relief plan sponsored by the Brooklyn Chamber of Commerce, and as reason for its adoption, said in a headline: "Factories are being weaned away from New York by small towns as city debates how to ease traffic jam costing $1,000,000,000 annually."

Early in 1929 the Chicago *Tribune* catalogued fifty industries which have recently moved from Chicago to Indiana points. Lack of proper port facilities was assigned as the principal cause for this exodus, despite the fact that Chicago's switching district, with its more than 4000 industrial tracks and favorable switching rates, offers advantages of transportation to many lines of manufacture superior to those offered anywhere else. The vast intra-terminal traffic of Chicago's switching district, by which the manufacturing industries of the district supplement each other in innumerable ways, has contributed vastly to the industrial growth of the second city in America. Whatever may be the effect of limited port facilities for Chicago manufacturers, it is interesting that quite a number of the plants which have removed, went to Indiana towns which have no water transportation whatever, while a number of others which moved to nearby Lake towns manufacture products in the transportation of which ships and boats offer few if any advantages over transit by rail.

THE SMALL TOWN'S OPPORTUNITY

For the smaller communities, these new industrial policies happily coincide in opportunity and the ability to avail themselves of the opportunity. It is to the smaller communities that industry principally must look for more economic locations, and these communities are ready for new industries because they have been electrified and because they enjoy the swift and flexible transportation of the modern highway and improved rail service. The extent to which the smaller communities have been prepared for the expansion of industry is indicated by a gain of 4000 in the number of towns and villages served by electric light and power companies in five years. This is a growth of 25 percent in a type of electric service available for shop and mill, a service to which isolated small town plants are usually not adapted.

A recent article in *Power* says "The last 24 years have witnessed a material change in the type of power that has been placed at the service of American labor. Prior to 1889 practically all the machinery was driven mechanically by steam and water. Endless shafts and belts clogged the mills and factories of the nation, and efficient and rapid operation of machinery was next to impossible. But with the advent of the electric motor, American industry entered a new era. Its adoption was rapid. From 1904 to 1919 the installed electrical horsepower per worker increased from 0.3 to 1.8, an increase of 500 percent in the fifteen-year period. But since the war this installation has increased to 3.5 h.p. per worker, leaving less than 1.2 h.p. of other drive installed per worker."

In the introduction to the Metropolitan Life Insurance Company's study on industrial migration (see footnote page 35) the various tendencies are discussed as follows:

"As to the reasons underlying the industrial growth of the smaller cities, those most frequently reported might directly or indirectly be related to lower manufacturing costs. Improved railway and power service has also been beneficial to the development of these cities. Electrical power has become available within the last five years for the first time to four thousand towns and villages formerly without service. These small towns have the same quality of twenty-four hour electric service formerly enjoyed only by large cities. They also have unlimited electric power supplies available to them to meet the expanding demands incidental to the growth of their community. Factories can locate in a small town supplied with electric power from an interconnected system, confident that they can have dependable electric service.

"If we arbitrarily take a population of 50,000 as a dividing line between the larger and smaller cities, we find that the branches and relocations were divided nearly equally between these two types of cities, but that approximately three-fourths of the new local plants were established in the larger cities. All types of plants established in the larger cities accounted for 58.4 per cent of the total gains in employment reported in the survey. There are various reasons for this continued industrial growth of the larger cities, one of which is the large number of satellite industries which are established around existing industries located therein, and another is the development of style industries in clothing and related groups in metropolitan areas.

"The extent to which the smaller cities have gained through the establishment of branches and relocations within their borders is worthy of special note. Of all gains made by these

cities, those under 10,000 in population received 26.2 per cent of all branches reported in the survey and 17.9 per cent of the relocations.

"The foregoing statistical survey indicates that cities of 50,000 and over received about 75 per cent of all plant gains. The record of the smaller cities is undoubtedly better than this figure would indicate, because approximately 90 per cent of all cities in the United States with a population exceeding 10,000 made reports, whereas only 33 per cent of the cities between 2,500 and 10,000 submitted their experience and a still smaller percentage of the cities under 2,500. If we were to make an allowance for this unequal representation of the larger cities, the percentage of all plant gains by the cities under 50,000 would be increased to approximately 35 per cent.

"The losses experienced by the different size cities must be analyzed before the net gain can be determined. The larger cities experience a greater percentage of losses than the smaller ones. Thus the cities with a population of 50,000 or more reported 83 per cent of the total losses in the number of plants and 70 per cent of the total losses in the number of employees included within the whole survey. Deducting the losses from the gains for each class of cities, we develop the following table which indicates the plants established in cities over 50,000 account for 60 per cent of the net gains in number of plants located during the two year period under investigation, leaving the smaller cities 40 per cent of the total net gains.

39 per cent of total net gains went to cities of 150,000 or over
21 per cent to cities of 50,000 to 149,999
21 per cent to cities of 10,000 to 49,999
13 per cent to cities of 2,500 to 9,999
6 per cent to cities under 2,500

"The larger cities of 50,000 population and over received 54 per cent of the plants employing one hundred or more workers, whereas the smaller cities received the remaining 46 per cent of these larger plants, more than one-half of which located in cities of less than 10,000 population."

V.

MOVE WHAT IS CHEAPEST TO MOVE

There is nothing mysterious or complicated in the reasons back of these recent industrial changes. When they are boiled down to fundamental causes the commanding role of distributable electric power is made clear. All production is a matter of moving things—extracting, assembling, synthesizing or distributing. The secret of efficient production is to move what is cheapest to move. Manufacturing plants now seek smaller towns for exactly the same reasons that they formerly massed in great cities. Management chooses to locate where production is most efficient. To make the goods that the consumer will buy, men, raw materials and power must be assembled, and the cost of getting them together largely determines the price.

There are few if any locations where all three elements, men, power and materials, are found together in sufficient quantities. When the steam engine massed men about great forests of factory chimneys in the industrial cities, it was necessary to move to these cities food for the men, fuel for the engines, and raw materials out of which the goods were to be manufactured.

TRANSPORTATION ABSORBS ENERGY

The capacity of such factories to turn out goods was vastly greater than that of the scattered handicrafts and cottage industries which they displaced. But this advantage was largely counterbalanced by the great amount of transportation and distribution service made necessary by the widening gap between men and soil, engines and fuel. As concentration increased, as cities and factories grew larger, these gaps grew wider. It was necessary to spin webs of shining rails further out to virgin soil, uncut forests and new found coal beds. One great American railway, which grew up as a lumber railroad serving hundreds of woodworking industries in Wisconsin, actually extended itself all the way to the great spruce forests of the Pacific Northwest and converted itself into a transcontinental line in the effort to bridge a gap of this kind.

Advanced industry now moves the element which is moved most cheaply and thereby cuts down the gaps between food and men, raw materials and machines, fuel and engines.

By moving power along copper wires, the movement of fuel to engines is vastly reduced. Transportation effort required to supply a few great central generating stations using fuel most economically is vastly less than that required to move fuel through congested terminals, over costly rights of way into congested industrial centers, and, of course, much less than that required to move smaller individual shipments of fuel to isolated and dispersed factories not supplied with interconnected power.

Electric power moves itself instantaneously, once its copper circuits are constructed and energized. The self-movement of its power to factories located strategically with regard to raw materials and the easily accessible food supplies of small communities, eliminates the expense of the laborious movement of raw materials from other sources to the point of manufacture.

It not only cuts down the movement of men and materials; it reduces the time formerly required for this transportation. It saves human energy, conserves wealth and distributes it more widely.

When power supply was concentrated, population necessarily had to be massed about the steam engine or the water power site. But at the same time billions of dollars of capital had to be invested in transportation of raw materials to the centers of power production, and for the transport of finished goods to far distant and scattered markets.

HAULING BACK AND FORTH

Much of this transportation was uneconomic cross-hauling. Freight trains carrying the same materials in different stages of fabrication passed each other more and more as manufacturing was concentrated.

For the sake of clarity it is well to bear in mind that the older concentration of industry was no unilateral process. Strictly speaking there are no such things as absolute concentration or diffusion in social and economic affairs, because every movement to a center is offset to some extent by outward movements of capital and labor. So that the older concentration of industry also carried with

it a process of diffusion of business efforts. It involved a tremendous aggrandizement of the transportation industries and a multiplication of the costs of distribution.

A great part of this cross-hauling and trade duplication is socially profitless. Much of it, of course, is due to the fact that the location of our railways and cities was to some extent determined by historical and political reasons rather than reasons of physical geography.

EFFECT OF LOCATION ON TRANSPORTATION

America resulted from an East to West movement, crossing the mountain ranges of the continent, not from settlements at the mouths of the Mississippi and the St. Lawrence.

A document which is claimed to be a banker's memorandum submitted to Lord Salisbury in 1895, whether genuine or spurious, tells this story in indisputable facts and figures.

After sketching the growth of the American railway system, which of course followed the lines of settlement, this document says—

"The figures show that for a population of 70 millions the railways of the United States are called upon to move a tonnage almost as great as that of Europe, for almost five times the population, and whose labor produces a vastly greater output: and when in addition to this, the average distance hauled in the United States is considered, which is four times as great as Europe, the discrepancy becomes amazing. In 1894, tons of freight moved in the United States reached 675,000,000. The mileage haul shows that the average distance hauled was about 123 miles, three per cent more than the previous year, that is to say, ten tons per capita 123 miles; against this, Europe's haulage of less than 800,000,000 tons, an average of 35 miles. Reduced, this means that it takes at least 17 times as much railway hauling per capita to serve the population of the United States as to serve that of Europe."

While conditions have radically changed since that time, a change immensely for the better, the facts set forth show why American standards of living for nearly a century were only slowly improved, notwithstanding the fact that a small population had at its disposal the wealth of the richest lands on the earth. The facts clearly indicate the immense importance of the opportunity which was presented at the close of the first decade of this century to begin a reorganization of our entire economic set-up by decentralization of industry through the application of distributable power.

USE OF POWER DIFFUSED, PRODUCTION CENTRALIZED

However, this new decentralization, which has been initiated by organizations like the Middle West Utilities System, is also in part a process of concentration, because the production of power is centralized more than

ever before, but this concentration of power generation for the purposes of the utmost and widest availability of power, is the most economical form of concentrated economic activity which has ever been employed. Because electrical power moves itself from its point of generation, the centralization of its production involves less transport of fuel and materials—less mechanical movement of all sorts—than any other possible industrial arrangement or tactic could secure. Because the centralized production of power now makes possible the application of adequate power to any task at practically any point in the country, we must widen our range of vision to observe what is going on in industry and trade.

Our statistics of transportation bear witness to the transformation being wrought by distributable electric power. They show that power is being brought closer to the primary wealth of farm, mine and forest. In proportion to population served there is less hauling of raw material and more hauling of manufactured goods, and more transmission of electric power. Electric power is reducing the overhead of transportation cost for every community it serves, and the inventory and capital costs of every industry which uses it.

Here again we find electric power translating into business accounting its function of overcoming space and time, because freight bills and interest charges are costs of conquering space and time.

It is obvious that a growing population, with a scale of living being continuously elevated, will require more transportation service year after year, and unless something is being substituted for transportation, it is obvious that this service should increase in proportion to population, and in proportion to the increased consumption of goods and services by people.

America is primarily a railway country, and a study of trends in railway transport will show what is happening in this respect. Of course, automotive and water transportation have diverted from the rails some long and some short haul traffic. The extension of oil and gas pipe lines has also had this effect. But, it is extremely doubtful if the sum of all these diversions is equal to the immense increases in railway traffic which have resulted from the growth of the automobile industry and its stimulation of other industries such as steel, oil, rubber, textiles, nonferrous metals, highway building and construction,—especially hotels, garages and filling stations. It is also true that the increased efficiency in the combustion of coal by railroads and by central generating stations of the electric power industry in the great cities, and also the economies effected by the generating stations serving the smaller communities, has reduced the movement of fuel on the railroads, irrespective of the reduction of fuel movement which is more directly a consequence of industrial decentralization and the movement of manufacture nearer to the sources of primary wealth.

Nevertheless, the marked decline in rate of growth of railway freight transportation in recent years in the face of a continued concentration of population, and the increasing quantity of goods and services consumed per capita, to say nothing of the transportation demand of the great construction boom which began in 1922, clearly hints of the effects of the wide substitution of movement of power for the movement of materials.

In the seven-year period ending with 1906 the number of tons carried one mile increased 75 per cent: in the period ending with 1913 the increase was 38 per cent: in the period ending with 1920 the advance was again 38 per cent: and in the seven years ending with 1927 it was 5 per cent. Population increase during these periods has been practically constant. The smallest increase of population during these periods was 10 per cent and the largest only 15 per cent.

This slowing down of increase in net ton-mileage continued in 1928. Class 1 railroads showed an increase of only 0.5% over 1927, but a decrease of 2.4% from the total for 1926. The Eastern District showed a decrease of 1.4%, the Southern District showed a decrease of 5.4%, but the Western District reported an increase of 5.4%.

Of particular significance are the figures covering "tonnage originated" because they are not affected by changes in the distance freight is hauled, and therefore throw more light on the amount of commodities of various kinds that the people are producing, consuming and shipping by rail. In the seven years ending with 1906 the tonnage originated on the railways increased 85.6 per cent: in the seven years ending with 1913, the increase was 28.3 per cent: in the seven years ending with 1920 it was 19.3 per cent: and in the seven years ending with 1927, it was 2.1 per cent.

Less hauling of raw materials and increasing haulage of manufactured products is a matter of hard statistics.

"Tonnage originated" of products of agriculture increased 10.4% between 1913 and 1927. Products of forests increased 6.0%. And products of manufacture increased 38.4%. Ores declined 17.2%, but bars and sheet metal (partially finished products) increased 105.8%.

To summarize, between 1913 and 1927 tonnage originated increased 21.8% while population was increasing 25.2%.

The same trend appears if we compare the percentage which tonnage originated of each class of product was of the grand total in the year 1917, with the same percentage for the year 1927.

	% of Total 1917	% of Total 1927
Products of Agriculture	8.04	8.65
Products of Animals	2.41	1.97
Products of Mines	57.85	55.54
Products of Forests	8.91	8.15
Manufactures	19.14	22.75
Merchandise (less-than-carload lots)	3.65	2.94
	100.00	100.00

It will be noted that transportation of the products of mines and forests is decreasing in percentage and the manufactures percentage is on the increase. It is interesting that while this declining trend in railway freight transportation has become evident, development of the raw resources, in areas usually far distant from the great metropolitan centers of the country, has been going on with ever increasing vigor.

On the other hand the consumption of electric power has increased 400% during that same period. Electric power lines capable of carrying electric current great distances from large generating plants spanned more than 25,000 additional miles in the four years from 1923 to 1927.

As movement of raw materials gives way to movement of finished products, and as both kinds of movement are exceeded in rate of growth by movement of electric power, the economy and facility of "moving what is cheapest to move"—electric power—asserts itself.

VI.

PROGRESS OF THE NEW FRONTIER

The growth of the New Frontier is not theory. It is history in the making. The statistics, although incomplete because the process is incomplete, nevertheless demonstrate that America has turned the corner.

As the Middle West Utilities System has grown by extending to a great population, in small town and countryside, the type of electrical service which makes possible the condition we call modernity, it is not only specially interested in what is going on where these millions live, but it is in an advantageous position to observe the emergence of a new industrial order and a higher plane of living among them.

The facts available at this writing warrant the conclusion that the maximum rate of real wealth accumulation, and the greatest gains of individual and social welfare are no longer being achieved in the greater metropolitan centers, but in the smaller communities.

Wherever the beneficial effects of distributable power are not offset by other forces, or handicapped by extraneous conditions which have obscured their observation, this is evidenced by our statistical information about national wealth and income.

Some of the progress now being made in the smaller communities is, of course, a mere levelling up to the standards already attained in the larger communities, but in the smaller communities, where the new forces have had free play, and have been in operation long enough, the average standards of living exceed those of the areas of congested population.

WHERE GROWTH IS MOST STRIKING

The widespread transmission of electricity has brought the turn of the balance between communities of concentrated industrial and financial wealth and small communities situated nearer the primary wealth of forest, mines and farm. Our statistics of wealth and of banking power disclose that the most striking instances of our growth are no longer in states which have great metropolitan centers.

It is difficult to trace movements of the kind under discussion here in our financial statistics for two reasons. Our statistics are largely compiled by states, and the American state is rarely a division of business geography. Conditions of climate, terrain, proportions of urban and rural population, character of production and the relative values of real estate, industrial and financial wealth differ in every American commonwealth. The variations in the purchasing power of money, which have been especially violent since 1914, make comparisons of different periods precarious. The precipitous rise and fall of rural land values and with them crops, live stock and other farm property, invalidate comparisons between states by statistics expressed in dollar values, from the standpoint of a comparison of real wealth. It is obvious that a decline in the dollar value of farm lands does not reduce the number of acres of farm lands, and does not indicate any diminution of real wealth. Consequently in any discussion of fundamental and long time changes in the distribution of wealth and welfare throughout the country, such statistics in units of states and dollar values under-rate the relative position of rural states.

In spite of these somewhat confusing conditions, however, the trends under discussion here are plainly reflected in such statistics as we have. To make this plain, it will be necessary to make some note of the distribution of population in the various states.

In the ranking of states as of 1920, according to the percentage of population living outside of towns of more than 10,000 population, New Mexico leads, followed by South Dakota, North Dakota, Mississippi, Arkansas, Idaho, South Carolina, North Carolina, Wyoming, Vermont, Arizona, Nevada, Oklahoma, Alabama, Kentucky, West Virginia, Georgia, Tennessee, Montana, Nebraska, Kansas, Texas, Virginia, Florida, Iowa, Maine, Louisiana, Minnesota, Utah, Wisconsin, Oregon, Colorado, Missouri, Indiana, New Hampshire, Washington, Delaware, Pennsylvania, Michigan, Ohio, Maryland, California, Illinois, Connecticut, New Jersey, New York, Massachusetts, Rhode Island.

Using the figures of the United States census, and the figures of the National Industrial Conference Board derived from them, and reducing all dollar figures to dollars of a constant purchasing power (in other words the "1913 dollar" of the professional statistician) we find that between 1912 and 1927, North Carolina showed the greatest *percentage of increase* in per capita wealth in all the United States. Next in order came, Tennessee, New Hampshire, South Dakota, Maine, Idaho, Wyoming, Mississippi, Virginia, Vermont.

Following is the order of the ten leading states in which per capita bank deposits have increased between the years 1912 and 1927: Delaware, Florida, North Carolina, Mississippi, Arkansas, Oklahoma, Maryland, New Jersey, Texas, Kentucky, Louisiana, Alabama, Tennessee, Virginia.

These cold statistical rankings are entirely out of tune with the superficial idea popular in some quarters that states full of so-called "hick" towns are scenes of stagnation and retrogression. As a matter of fact the statistics are but a feeble indication of the vigor and virility of the community life of these commonwealths. It is interesting to note how generalized statistics point to confirmation of the thesis advanced in this discussion, that electric power generated and delivered abundantly and cheaply enough to justify its use in mine, shop and mill, is the great equalizer of wealth and business opportunity.

In 1912 the lowest dollar value of per capita wealth, figured in 1913 dollars, was in North Carolina—$571. Nevada showed the largest $5,725. In 1927 the low per capita had been brought up to $834 (Alabama) and the high had been brought down (in Nevada again) to $4,896.

It is worth noting, too, that North Carolina from 1912 to 1927 showed one of the greatest percentage increases in all the states in the number of electrical customers and also in total kilowatt-hours used.

POWER DELIVERED TO PRIMARY WEALTH

An idea of the coming transformation of these areas by the movement of manufacture nearer to primary wealth, which is now being accelerated by a regime of universally distributed power, may be obtained from a glance at the relative rankings of certain states as to "primary wealth and total wealth." The states can be ranked as to primary wealth by their annual production of minerals, lumber, pulp wood and farm products.

Many of the states have long ranked low in finished production, money income and capital resources. Their heavy raw products have had to seek distant centers of manufacture and pay the freight. With manufacture brought closer to the source of the raw materials, freight tonnage is reduced, the more highly finished goods transported to market can pay higher freight rates and still yield the producer a greater profit.

Texas ranks second in importance in "primary" production—products of agriculture, mines and forests—but stands only eleventh in "wealth." West Virginia, seventh in total primary production, stands only 20th in "wealth."

Compared by value of manufactures in 1925, Texas, second in "primary" production, is only 14th in total value

of manufacture. Oklahoma, fourth in primary production, is only 34th in manufactures. West Virginia, seventh in primary production is only 25th in manufactures.

Compared by individual Federal income tax receipts (not including corporations) in dollars, Texas, second in primary, is only 12th in income. Oklahoma, 4th in primary, is 14th in income. West Virginia, 7th in primary, is 32nd in income. Iowa, 8th in primary, is 27th in income. Minnesota, 9th in primary, is 17th in income. Washington, 11th in primary, is 31st in income.

In comparison of total Federal income tax receipts, including both corporation and individual, Texas, 2nd in primary, is 10th in total income. Oklahoma, 4th in primary, is 17th in total income, West Virginia, 7th in primary, is 23rd in total income. Iowa, 8th in primary is 31st in total income. Minnesota, 9th in primary, is 16th in total income. Washington, 11th in primary, is 28th in total income.

These standings hint the indicated direction of the future flow of income as a result of the movement of electric power, and therefore of manufacturing activity, toward areas of natural resources.

But we need not confine the measurements to trends alone. Actual results are perceptible, denoting a faster per-capita increase in the accepted indications of progress in non-metropolitan areas than in areas dominated by congested large cities. Statistics amply justify the conclusion that better living in the smaller communities of

America has followed the power line just as certainly as productive capacity and real wealth have increased everywhere the power line has been carried.

"SMALL TOWN" STATES LEAD

There are some available statistics which indicate that the smaller communities are making the most notable advance in good living. These statistics relate to material benefits such as better school buildings, new highways and the nearly universal family ownership of the automobile and use of the telephone. Such facts lie at the base of leisure and liberty from drudgery. They are factual foundations of a life lived with keener zest and appreciation of the possibilities for individual development and expression than was ever possible before. States without great metropolitan centers lead in this procession in several major respects.

First, in better schools. Between 1917 and 1924 government school censuses show the following rankings of states in *percentage of increase* in school expenditures:

Current expenses per pupil enrolled—North Carolina, Delaware, West Virginia, Maryland, Louisiana, Wisconsin, Missouri. *Value of school property* per pupil enrolled—Mississippi, North Carolina, Nebraska, Delaware, South Carolina, Arizona, Texas, Wyoming. *Outlay per pupil enrolled for new buildings*—Maryland, North Carolina, Delaware, Nevada, Maine, Georgia, California, New Hampshire, Alabama.

Second, in new highways. The year 1927 saw 2,887,928 miles of certified highways in the United States, and estimated expenditures of over $1,000,000,000 for new construction and upkeep. Expenditures for rural roads per-rural-capita increased from $4.76 in 1914 to $19.70 in 1926.

Third, in the use of the telephone. The rural state of Iowa had more telephones in 1927 per 1000 persons than any state except California. Illinois comes next, then Kansas, New York, and Nebraska. New Mexico has shown the greatest increase in telephones, 233 per cent since 1912. Florida, Louisiana, Nevada and New Jersey follow in the order named.

Fourth, in the nearly universal family ownership of the automobile. In 1928 there was a motor vehicle for every 5.12 persons in the United States. There were in 1920, the last census year, 4.34 persons in each family. Family ownership in the United States is approaching universality. In England, on the other hand, for purposes of comparison, there was one motor vehicle for each 37 persons.

As a rule, States with greatest rural and small town population showed the greatest actual per capita automobile registration and greatest increase in automobile registration in 1928, as compared with 1927. In 1928 the ranking in persons per motor car was: California, Nevada, Iowa, Kansas, Nebraska, Oregon, South Dakota, Colorado, North Dakota, and Michigan. In percentage of increase, the ranking was: Arizona, District of Columbia, Mississippi, South Dakota, Montana, New Mexico, Alabama, Connecticut, Tennessee and Texas. In both respects, the predominance of rural and small town states will be noted.

A NEW CHAPTER IN OUR HISTORY

This is a new chapter in our social history. The advance of culture into newly opened lands is older than the covered wagon. The growing convenience of city life is older than the steam engine, but the revival and enrichment of smaller communities in older settled sections has come with the advent of the electrical industry supplying power so flexible that it can be instantly applied anywhere to any task, from cleaning a carpet to running a mill.

It is difficult, of course, to evaluate in statistics alone the economic betterment of the small communities in regions remote from great metropolitan centers which has followed their connection with an energy supply as good as that of the cities. It is even more difficult to estimate how much better the people are living. It is not idealism but common sense to note that life is mostly a matter of intangible values; but intangibles are always rooted in material conditions. The drama of economics is the same as that of the drama of the scenario, the play or the novel. Humanity is the hero, want the villain, and until the villain is crushed or outwitted the hero has scant time to

develop those values which are associated with words like culture and idealism. For that matter it is impossible to compare the benefits of the material goods of today with those of the past. The difference in the dollar value of a horse and buggy and a cheap automobile is not great, and both are manufactured to meet the same need, but the difference in dollars utterly fails in the measurement of their different value in use. How compare an oil lamp and the modern mazda?

However, we are on safe ground when we say that richer lives result from more efficient work and more profitable business. They are the basis of any lasting improvement. Substitution of electric power for muscular toil raises the buying power of any community with mathematical certainty, simply because 2 cents expended for electrical energy will buy as much work as $12.50 spent for human physical effort.

PROGRESS IRRESPECTIVE OF POPULATION

Introduction of electric power into a community must have one of two effects. It either multiplies the productivity of all the workers in the community, thereby eventually raising the average purchasing power, or it may displace some of them and cause their removal to the cities, without raising the total output of the community, but thereby increasing the average buying power of those remaining.

That is, as already pointed out, back of the phenomenon of stationary or decreasing population and increasing prosperity which has puzzled many observers of small towns. Where the great cities have been gaining in population at the expense of the small communities, they have not been doing so at the expense of their economic prosperity, as was the case before the coming of distributable electric power.

Power delivered directly to the small communities, banishing household toil, has probably had an even greater effect in promoting finer living than power delivered to stores, shops and mills. It is worth while to remember also the effect of electrical power upon the life of the home, in which some 18,000,000 housewives carry on the most important work of the nation, although they never figure in the census totals of wealth, income, industrial production, labor or trade. Household services are not taken over in the small town by hotels, apartment houses and other such agencies as they are in the big city. It may be said, therefore, that it is the particular glory of distributable electric power, now pervading small communities of America and supplying to the household most of the conveniences possible to the greatest city, that it has rendered a service where it was needed most. For it is in the small community and on the farm that the household establishment is of the greatest importance from an economic standpoint.

In addition, movement of industry to the small community, so largely made possible by the electric power line, has directly benefited the farmer. W. M. Jardine, former Secretary of Agriculture, writing in the *Saturday Evening Post* of May 4, 1929, expresses the feeling that "agriculture stands to benefit greatly from industrial decentralization wherever that process is beneficial to industry." He cites a study by the University of Tennessee of two districts in Tennessee, both mainly agricultural, to show how industrial development in small towns affects agriculture, and declares:

> "One district is almost exclusively agricultural, while the other has a thriving industrial center. Agriculture in the district lacking industrial development has improved little in the past decade. In the other district agriculture has improved greatly, with corresponding progress in well-being. The two localities are nearly equal in soil fertility and in the character of their farming population. Hence, the superior agricultural development of the locality containing an industrial town is evidently related to that fact. This contrast is significant because a decided spread of American industry into rural districts is taking place. Nearly every state in the Union can furnish examples like that revealed in the Tennessee study."

Rural industry, Mr. Jardine points out, gives the farmer better local markets and helps him to get improved roads and schools. Furthermore, farm electrification is facilitated when rural districts contain power using industries. Mr. Jardine continues:

> "In addition, industrial development in agricultural districts boosts farm-land values, distributes tax burdens more equitably, and improves agricultural-credit facilities. Also it favorably influences farming methods. . . . .
>
> "Agricultural people also benefit from the employment opportunities afforded by near-by industrial development. . . . Industrial expansion in small towns takes surplus labor from the farm without necessarily removing it from the farm home. This fact may have important consequences.
>
> "Agriculture's welfare depends upon the geographical distribution of the increased population as well as upon its total amount. Concentrated in comparatively few large cities, the

increase would favor specialization rather than diversification in agriculture. It would put a premium on the production of the cereals and meats, and a penalty on the production of milk, fruits and vegetables. Since this is undesirable, the present tendency of industry, and therefore of population, to spread throughout the country, and to take root in thousands of small towns and cities, should be hailed with gratification. It brings town and country together in a mutually profitable interchange of services. While the country gives the town an increasing variety of high-quality goods and perhaps also a part of its labor supply, the town reciprocates by spreading over the surrounding countryside a network of services which farmers too often lack. This interchange of services is intellectual and aesthetic as well as economic, and the bargain is by no means one-sided. Farmer and townsman can each learn from the other many things essential to the upbuilding of a truly civilized community."

VII.

THE FLOW OF CAPITAL AND THE FLOW OF POWER

The story of technical triumph, equalization of wealth and opportunity, and the social amelioration of the smaller communities of America written into our history since 1912 by the Middle West Utilities System, and other organizations which have taken up the trail it blazed, cannot be understood without some reference to the evolution of the corporate structure and financial organization which has made it possible.

The Middle West Utilities System consists of a group of electric service companies under the direction of the Middle West Utilities Company, a public utility investment (or so-called "holding") company.

The public utility investment companies which have made it possible to give to scattered communities an electrical power service equivalent to that rendered to great metropolitan centers are a natural consequence of the economic conditions from which they have arisen. They have grown out of the economic soil exactly as an oak grows from the earth, or as the political institutions of a people grow out of the geographical environment and historical adventures of the nation.

The corporate form of business was not invented by financiers. It was made necessary by the steam engine.

When the father of modern economics, Adam Smith, was writing his "Wealth of Nations," only a few miles from the place where James Watt was perfecting a practical steam engine, he expressed the opinion that joint stock companies were only adapted to the management of banks and canals.

He was familiar with little other corporate business, because it did not exist at that time, and it did not exist because there was no need for it.

Today corporations produce most of the electricity we use, most of the clothing and shoes worn by 120 million Americans, and a large part of the food they eat. From birth to death, the modern man is served every waking and sleeping hour by corporations of one kind or another.

It has been well said that corporations do all this and vastly more because they are paid to do it and because they can do it with the kind of ability inherent in the corporate form of organization, that is superior to production by individuals, partnerships or any other kind of co-operative organization, even with governments. That fact has been proved thousands of times.

WHY CORPORATIONS WERE FORMED

Corporations are merely a device for human team work, and in the main are a recent invention. Before the American Revolution the Colonies chartered less than 12 corporations, although some of the American colonies themselves were among the earliest enterprises undertaken by corporations, such as the London and Plymouth Companies. By the end of 1800 more than 300 corporations were chartered in the United States, but it was not until after the Civil War that the corporation became a dominant form of business organization.

The partnership had been the general form prior to that, but today less than one per cent of our business is done by partnerships.

First the canal and then the railroad created an imperative demand for the corporation. These were the first enterprises which were too large to be financed by individual fortunes. To provide the capital necessary for the construction of these great enterprises it was necessary to pool the money of great numbers of people. That idea was also in harmony with the rising democratic spirit of the early 19th century, and the American corporation is as much an outgrowth of American democracy as are our political institutions.

It is interesting that the corporation was at first almost exclusively a capital raising device. Operation of business was an afterthought, practically forced upon the organizers of the first corporations by the demands of the situation which they created, first by co-operative assembling of capital and the construction of great enterprises, which, immediately after construction, demonstrated that corporate conduct of the business was necessary.

In the case of canals, construction was the big job, because individuals could and did operate boats on the canals. One of our first railroads was constructed with the idea that individuals would operate trains upon its tracks, as stage coaches were run upon turnpikes, and the corporate operation of the railroad was forced by the confusion and disputes which resulted on the right of way.

Exactly as the coming of the railroad resulted in the evolution of a corporate system to build, operate and afterward to co-ordinate these systems of transit, on the advent of distributable electrical power we had the formation of utility investment companies, to provide the capital for the extension of adequate power facilities to the small communities of America.

Every turning point in our business history has in like manner resulted in changes in corporate organization, capital structure and finance. Finance and business organization must keep step with science and engineering or our country will not be enabled to enjoy the fruits of invention and discovery.

OUTGROWING LOCAL RESOURCES

When electrical service was essentially local it was usually possible to finance it locally, although even under those conditions capital could often be obtained more cheaply by the formation of investment, engineering and managing corporations to co-ordinate a number of electrical companies and thus improve the credit of all and thereby obtain access to the great capital markets of the world, which is the most feasible way to obtain cheaper capital and reduce fixed charges upon business enterprises.

But when it became necessary to replace hundreds of isolated power plants with interconnecting systems, energized from great central stations, local finance was simply impossible. So the modern utility investment corporation is a reflection, on the side of finance and corporate organization, of the turning point in American history, which came, with the demonstration that distributable power was feasible, in the closing years of the first decade of this century.

As the financial organization of the new system of energizing the United States has developed, it has produced an interesting analogy of the flow of electric power and the flow of money and credit, which has made it possible to distribute electric power under the conditions demanded by modern civilization.

To provide power over wide areas has required the construction of great central generating stations and webs of power lines, which, with the distributing systems in the various communities, reach out to millions of consumers. In like manner capital is assembled by great utility investment corporations and flows from them out to the operating companies which disseminate electric current. The electric power which flows to the consumer enhances his productive capacity, and lowers his cost of living, thus creating surpluses of investible wealth in the smaller communities.

THE FLOW

The financial organization of the utility investment company reaches out to hundreds of thousands of these investors whose wealth has been enhanced directly or indirectly through previous investments in power facilities and a portion of the surplus created flows back to the utility investment corporation, and is in turn devoted to the construction of additional facilities for the dissemination of power.[1] Thus a continuous flow of electrical power outward from the central generating stations of the Middle West Utilities System is paralleled by a return flow of investment capital, which enables the system to be extended in scope and improved in efficiency. As long as this process is maintained there is every assurance that America will continue to prosper, and that the process of equalizing wealth and opportunity as between the various communities and sections of the United States will be carried on.

While this system appears to be complex and ultra modern it is essentially simple, because it is a natural growth in harmony with its economic environment and the history of our people. Indeed, from an historical standpoint the public utility investment corporation of today is nearer in function and ideal to the corporation as it was conceived by the great grandfathers of present day America than most other corporate institutions.

From another point of view a modern utility investment corporation is a consequence of the rapid growth of the electric light and power industry. From the nature of the electric power business, and from the nature of the service rendered, it would be impossible to finance it out of current earnings, even if the policy of government regulation of rates were not in effect, and of course, under a policy of regulation it is impossible to obtain the necessary capital from current earnings.

THE BASIC NEED OF CAPITAL

In common with many advanced industries, the electric light and power industry requires such great amounts of costly equipment that the turnover of its capital is very slow. That is, the ratio of its volume of sales to its volume of investments is very low, the dollar hardly being turned once in five years. The growth of the industry has been so great in recent years that it has had to raise new capital to spend upon development every year in an amount not far from three-fifths its entire receipts.

The annual investments have exceeded the amounts left after operating expenses have been met year after year. In every day language this means that the industry must "spend" more than it "makes".

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[1] "The public utility investment (or so-called "holding") company was able to establish itself in national security markets by its ownership of electric service properties in widely separated geographical sections. It was thus able to secure capital on advantageous terms and to invest that capital in the common stocks of its subsidiary companies. Thus the major risk of each subsidiary company was assumed by the investment company, which minimized the risk by spreading it. As a consequence the bonds and preferred stocks of each subsidiary company—the senior securities having preference over the common stock—found a ready market because their soundness and attractiveness to the investor was increased. The result has been a ready, economical flow of capital into electric facilities of non-metropolitan sections and a constant expansion of service to meet the industrial growth of such areas and to provide electric service for the always increasing number of uses in industry and agriculture and in the home."—from an article, "The Public Utility Investment Company", by Martin J. Insull, in New York Journal of Commerce.

In the case of the fast growing electric light and power industry it has happened that companies have had to spend more money in a single year than their entire receipts.

It is obvious that the expansion of the electric light and power industry at a rate sufficient to meet the needs of these fast moving conditions which it has so largely created must be based upon deep and strong financial foundations.

That is another way of saying that it must be based upon the money and credit of the great majority of American investors, because no single group in America today has either the wealth or credit to provide the money needed.

To reach the great army of saving and investing people in America it is necessary to have a national financial organization which can keep contact with all parts of the country, big enough, and strong enough, to command the most favorable terms in the great money centers of the world. Such organizations must command the confidence of their consumers, and of the great mass of investors throughout the length and breadth of America.

Because of their inbred capacity to organize and a corresponding capacity to understand men and institutions engaged in great works and enterprises, the electrical light and power industry up to the present time has had, and has deserved the support of the people, which has made its progress possible.

American prosperity, welfare and wealth, and the hope of a better life, are so indissolubly bound up with the provision of an adequate and equal energy supply throughout this country that it may safely be said that this leadership has taken us far from the lean hard days, which millions already knew in America at the beginning of the 20th century, when an American poet could write "The Man with the Hoe" and thrill millions. Today that poem is almost incomprehensible to the generation which has come to manhood and womanhood in an age of power driven machinery. The old themes of toil and revolt are almost incomprehensible to the modern high school lad educated in an environment of chemistry, physics, radio sets, electric machinery and gasoline motors—the very apparatus of man's victory over drudgery. The youth of today has its eyes already in the clouds as the age of flight dawns to give even wider freedom from the bonds of space and time.

The modern farm lad who drives a tractor, controlling with the turn of his wrist the power of a herd of horses, the modern workingman who drives machines sped by the power of thunderbolts are both attuned to the new time of an empowered people—of masses who are masters of enslaved natural energies. The ancient world of servile toil assigned these powers to a god on a mountain. Modern engineering has enchained them as slaves of everyman.

PRINCIPAL ELECTRIC SERVICE COMPANIES OF MIDDLE WEST UTILITIES SYSTEM

Central Illinois Public Service Company
Central Maine Power Company
Central Power and Light Company *(Texas)*
Central Power Company *(Nebraska)*
Cumberland County Power and Light Company *(Maine)*
Eastern Shore Public Service Company *(Del., Md., Va.)*
Florida Power Corporation
Georgia Power and Light Company
Great Lakes Power Company, Ltd. *(Canada)*
Illinois Northern Utilities Company
Jersey Central Power & Light Company
The Kansas Electric Power Company
Kentucky Utilities Company
Lake Superior District Power Company *(Wisconsin, Michigan)*
Michigan Electric Power Company
Michigan Gas and Electric Company
Missouri Gas & Electric Service Company
Northwestern Public Service Company *(Nebraska, South Dakota)*
Ohio Electric Power Company
Old Dominion Power Company *(Virginia)*
Penn Central Light and Power Company *(Pennsylvania)*
Public Service Company of New Hampshire
Public Service Company of Oklahoma
Public Service Corporation of Vermont
Southwestern Gas and Electric Company *(Ark., La., Miss., Tex.)*
Southwestern Light & Power Company *(Oklahoma)*
Tide Water Power Company *(Florida, North Carolina)*
The Twin State Gas & Electric Company *(N. H., Vt., N. Y.)*
Vermont Hydro-Electric Corporation
Virginia Public Service Company
West Texas Utilities Company
Wisconsin Power and Light Company

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